11. (Currently Amended) A component, comprising:

a substrate formed of silicon nitride or silicon carbide; and

a protective coating of crystalline composition on an outer surface of the substrate;

the protective coating including a mixture of tantalum oxide (Ta_2O_5) and La_2O_3;

wherein the La_2O_3 concentration is in the range of about 1-10 mol%; ~~and~~

~~wherein a presence of CaO is eliminated~~.

12-13. (Canceled)

14. (Currently Amended) A component, comprising:

a substrate formed of silicon nitride or silicon carbide; and

a protective coating of crystalline composition on an outer surface of the substrate;

the protective coating including a mixture of tantalum oxide (Ta_2O_5) and an additive of at least one of Al_2O_3 and La_2O_3;

~~wherein a presence of CaO is eliminated;~~

wherein the La_2O_3 concentration is in the range of about 1-10 mol%; and

wherein the coating has needle-shaped La_2O_3 – Ta_2O_5 precipitates.

15 -20 (Canceled).

21. (Currently Amended) A component comprising:

a silicon-based substrate;

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and aluminum oxide (Al_2O_3) for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5; and

wherein the aluminum oxide (Al_2O_3) concentration is as low as 11 mol% ~~and wherein a presence of CaO is eliminated~~;

wherein the coating further includes an additive selected from the group consisting of carbides, borides and silicides.

22. (Previously Presented) A component comprising:

a silicon-based substrate; and

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and La_2O_3 for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5, the La_2O_3 being in the range of about 1 -10 mol% before application of the coating.

23 – 24. (Canceled)

25. (Previously Presented) The component according to Claim 22, wherein the silicon-based substrate is one of a silicon nitride substrate and a silicon carbide substrate.

26. (Previously Presented) A component comprising:

a silicon-based substrate; and

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and La_2O_3 for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5, the La_2O_3 being in the range of about 1 -10 mol% before application of the coating;

wherein the protective coating further includes aluminum oxide (Al_2O_3).

27. (Previously Presented) The component according to Claim 26, wherein the aluminum oxide is in the range of about 1-50 mol% before application of the coating.

28. (Previously Presented) The component according to Claim 26, wherein the aluminum oxide is in the range of about 1-50 mol% after application of the coating.

29. (Previously Presented) A component, comprising:

a substrate formed of silicon nitride or silicon carbide; and

a protective coating of crystalline composition on an outer surface of the substrate; and

the protective coating including a mixture of tantalum oxide (Ta_2O_5) and La_2O_3;

wherein the La_2O_3 concentration is in the range of about 1-10 mol%.

30. (Previously Presented) The component in claim 29, wherein the coating further comprises Al_2O_3 in the range of 1-11 mol%.

31. (Previously Presented) The component in claim 29, wherein the protective coating has needle-shaped La_2O_3-Ta_2O_3 precipitates.

32. (Previously Presented) A component, comprising:

a substrate formed of silicon nitride or silicon carbide; and

a thermal protective coating of crystalline composition on an outer surface of the substrate; and

the thermal protective coating including a mixture of tantalum oxide (Ta_2O_5) and La_2O_3; and

wherein a surface of the thermal protective coating has needle-shaped La_2O_3- Ta_2O_5 precipitates.

33. (Previously Presented) A method of protecting a silicon nitride (Si_3N_4) or silicon carbide (SiC) substrate against repeated thermal cycles at elevated temperatures, the method comprising:

mixing La_2O_3 in the range of about 1-10mol% with a quantity of tantalum oxide (Ta_2O_5) powder;

preheating the mixture; and

applying the heated mixture to the substrate.

34. (Previously Presented) A component comprising:

a silicon-based substrate;

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and an additive for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5;

wherein the additive includes La_2O_3 in a concentration in the range of about 1-10 mol% after application of the coating.

35. (Previously Presented) A method of protecting a silicon nitride (Si_3N_4) or silicon carbide (SiC) substrate against repeated thermal cycles at elevated temperatures, the method comprising:

mixing La_2O_3 with a quantity of tantalum oxide (Ta_2O_5) powder;

preheating the mixture; and

applying the heated mixture to the substrate;

wherein the La_2O_3 concentration before applying the heated mixture to the substrate is in the range of about 1-10 mol%.

36-40 (Cancelled)

41. (Previously Presented) A method of applying a protective coating onto a silicon-based substrate, the method comprising:

mixing Ta_2O_5 powder with La_2O_3 powder to create a ceramic mixture;

roughening the silicon-based substrate surface;

degreasing the silicon-based substrate surface;

preheating the silicon-based substrate to about 1000°C;

applying the ceramic mixture onto the silicon-based substrate surface with an air-plasma spraying process;

melting the ceramic mixture;

quenching the silicon-based substrate; and

solidifying the ceramic mixture into a protective coating.

42. (Previously Presented) The method of claim 41, wherein the silicon-based substrate comprises silicon nitride (Si_3N_4).

43. (Previously Presented) The method of claim 41, wherein the silicon-substrate comprises silicon carbide (SiC).

44. (Previously Presented) The method of claim 41, wherein the protective coating thickness is in the range of about 50 microns to about 250 microns.

45. (Previously Presented) The method of claim 41, wherein the La_2O_3 concentration is in the range of about 3 mol% to about 10 mol% before applying the ceramic mixture onto the silicon-based substrate.

46 -48. (Canceled)

49. (Currently Amended) A component comprising:

a silicon-based substrate;

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and aluminum oxide (Al_2O_3) for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5;

wherein the protective coating is substantially crystalline ~~and wherein a presence of CaO is eliminated~~;

wherein the protective coating further includes an oxide, compound, or precursor chosen from the group consisting of Hf, Si, Ln (rare earth including whole lanthanum series and yttrium), Mg, Mo, Ni, Nb, Sr, and Ti; and

wherein the protective coating further includes an additive selected from the group consisting of nitrides, carbides, borides and silicides.

50. (Canceled)

51. (Currently Amended) A component comprising:

a silicon-based substrate;

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and aluminum oxide (Al_2O_3) for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5; and

wherein the protective coating is substantially crystalline ~~and wherein a presence of CaO is eliminated~~;

wherein the coating further includes an additive selected from the group consisting of carbides, borides and silicides.